

Pediatric Mental Health Care Access Grant

Acquired/Traumatic Brain Injury:

Recognizing the Source and Proper Steps to Take Following Acquired Head Impact and Chronic Symptomatology

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OBJECTIVES

- 1. Review the Types of Brain Injury**
- 2. Identify the Prevalence and Effects of Brain Injury**
- 3. Describe Treatment Approaches**

TYPES OF BRAIN INJURY



TYPES OF BRAIN INJURY

Acquired Brain Injury

Non-Traumatic Brain Injury

1. Anoxia
2. Infections
3. Strokes
4. Tremors
5. Metabolic Disorders

Traumatic Brain Injury

Open Brain Injury

1. Penetrating
2. Assaults
3. Falls
4. Abuse
5. Surgery

Closed Brain Injury

1. Internal Pressure & Sheering
2. Assaults
3. Falls
4. Abuse
5. Accident



TYPES OF BRAIN INJURY

Acquired Brain Injury

- An injury to the brain that has occurred after birth and is not hereditary, congenital, or degenerative.
- The injury commonly results in a change in:
 - Neuronal activity
 - Which affects neurons in the following ways:
 - Physical integrity
 - Metabolic activity
 - Functional ability
- The term does not refer to brain injuries induced by birth trauma



TYPES OF BRAIN INJURY

Traumatic Brain Injury

- A TBI is an insult to the brain
- Not of a degenerative or congenital nature
- Caused by an external physical force
- That may produce a diminished or altered state of consciousness
- Results in an impairment of cognitive abilities and/or physical functioning.
- May also result in a disturbance of behavioral or emotional functioning
- These effects may be either temporary or permanent and cause partial or total functional disability

TYPES OF BRAIN INJURY

Traumatic Brain Injury

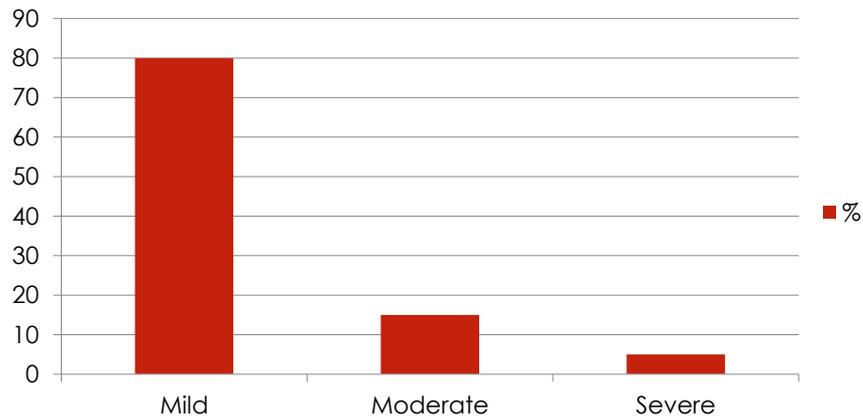
- Tumors
- Blood Clots
- Strokes
- Seizures
- Toxic Exposure (substance abuse, lead, inhalants, etc.)
- Infections (encephalitis, meningitis, etc.)
- Metabolic Disorders (insulin shock, diabetic coma, liver and kidney disease, etc.)
- Neurotoxic Poisoning (airway obstruction, strangulation, drowning, etc.)
- Lack of oxygen to the brain (anoxia)

TYPES OF BRAIN INJURY

Mild	Moderate	Severe
<ul style="list-style-type: none"> • <u>Primary damage / Injury mechanism</u>: predominantly blast, non-penetrating • <u>Loss/alteration of consciousness</u>: <30 minutes • <u>Amnesia</u>: <24 hours • <u>GCS</u>: 13-15 • <u>Imaging</u>: negative • <u>Comorbidity</u>: Post Traumatic Stress Disorder; overlapping symptoms • <u>Outcome</u>: Transient neuropsychiatric deficits, mostly full-recovery, long-term neuropsychiatric especially after repeated injuries are frequent 	<ul style="list-style-type: none"> • <u>Primary damage / Injury mechanism</u>: frequently mixed, blast + acceleration/deceleration, typically non-penetrating • <u>Loss/alteration of consciousness</u>: >30 minutes, <24 hours • <u>Amnesia</u>: >24 hours, <7 days • <u>GCS</u>: 9-12 • <u>Imaging</u>: transient changes • <u>Comorbidity</u>: PTSD, other injuries • <u>Outcome</u>: mild-to-moderate, typically chronic, neurological and neuropsychiatric abnormalities 	<ul style="list-style-type: none"> • <u>Primary damage / Injury mechanism</u>: complex, blast + acceleration/deceleration + penetration • <u>Loss/alteration of consciousness</u>: >24 hours • <u>Amnesia</u>: >7 days • <u>GCS</u>: <9 • <u>Imaging</u>: positive, lasting abnormalities • <u>Comorbidity</u>: Polytrauma, such as multiple-organ injuries • <u>Outcome</u>: death, significant, neurological and neuropsychiatric deficits, severe, chronic physical and neuropsychiatric disabilities

TYPES OF BRAIN INJURY

Estimates of Injury Severity in %



TYPES OF BRAIN INJURY

Post-Concussion Syndrome

- It is estimated that 10% of individuals with a head injury will have persistent symptoms
 - Problems with:
 - Attention
 - Memory
 - Fatigue
 - Sleep
 - Headache
 - Dizziness
 - Irritability
 - Changes in Mood and Personality



TYPES OF BRAIN INJURY

Second Impact Syndrome

- **Second Impact Syndrome (SIS) can occur when an individual sustains an initial head injury and then sustains a second injury before symptoms from the first have fully resolved**
- **May occur due to diffuse cerebral swelling or subdural hematoma**
- **The second injury could occur minutes, days, or weeks after the initial injury and can be:**
 - **Fatal**
 - **Result in Severe Disability**
 - **Long-term neurological, neuropsychological, and/or psychiatric consequences**



TYPES OF BRAIN INJURY

Chronic Traumatic Encephalopathy (CTE)

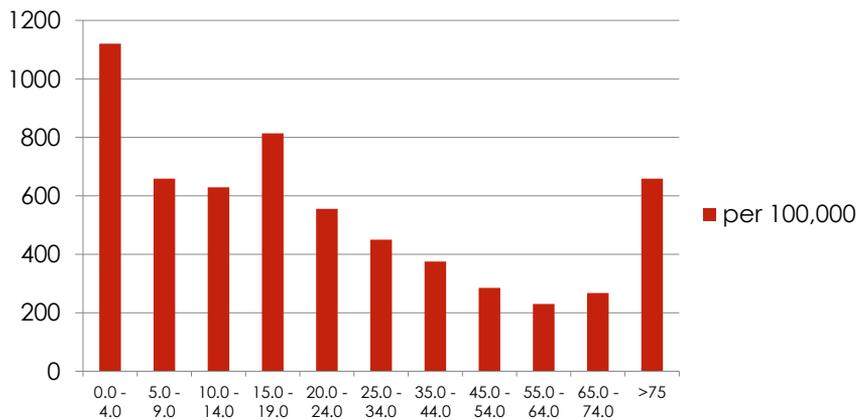
- **Repeated head injury**
- **Progressive degenerative disease**
- **Researchers have reported that symptoms appear to be similar to Alzheimer's Disease**
- **Other researchers indicate that CTS is a unique build-up of abnormal Tau Proteins and tangles in neurons**
- **Has been diagnosed after death in athletes with a history of multiple head injuries**
- **These effects could occur within months to years after the trauma**
- **Individuals with CTE may show symptoms of:**
 - **Dementia – memory loss**
 - **Aggression**
 - **Confusion**
 - **depression**

PREVALENCE OF BRAIN INJURY



PREVALENCE OF BRAIN INJURY

Incidence





PREVALENCE OF BRAIN INJURY

- **Traumatic Brain Injury is the leading cause of death and acquired disability in the US**
- **According to the CDC, the two age groups at greatest risk for TBI are children aged**
 - **0-4**
 - Falls
 - Abusive Head Trauma (Shaken Baby Syndrome)
 - **15-19**
 - Concussions (sports)
 - Falls
 - Motor Vehicle Crashes



PREVALENCE OF BRAIN INJURY

- **An estimated 10 million Americans are affected by ABI per year**
- **This makes brain injury the second most prevalent injury and disability in the United States**
- **Every 23 seconds one person in the U.S. sustains a TBI**
- **More than 50,000 people die every year as a result of TBI**
- **235,000 people are hospitalized each year with TBI**
- **80k-90k Americans experience the onset of a long-term disability following TBI each year**

EFFECTS OF BRAIN INJURY



EFFECTS OF BRAIN INJURY

- A widely held belief is that children's brains are resilient and the best time to have a brain injury is early in life

HOWEVER

- Young children are just as, if not more, vulnerable to the effects of brain injury than those that are injured later
- The prognosis for acquiring new skills is worse the younger the child is at the time of the brain injury

EFFECTS OF BRAIN INJURY

- **The effects of a brain injury early in life may not be recognized until later in life due to the areas of the brain that are impacted not being used until later in life**
 - **Less is expected of children early in life**
 - **Therefore, the effects of their injury may not be recognized or misinterpreted**
 - **Frontal lobe injury – executive functioning skills not being used until childhood/adolescence**
 - **Children with early brain injuries may be mislabeled later in life as having other types of learning, behavior, or emotional challenges**

EFFECTS OF BRAIN INJURY

- **Birth to 3 years:**
 - **Language acquisition**
 - **Refinements in sensory and motor systems**
 - **Regulation of sleep-wake patterns**
 - **Begin to understand cause-effect relationships**
 - **Emotionally egocentric**
 - **Symbiotic relationships with caregivers**
- **Behaviors after TBI:**
 - **Quick shifts from one emotion or state to another**
 - **Impulsivity**
 - **Use of primitive behaviors (biting, hitting, etc.)**
 - **Lack of self-awareness**
 - **Inability to self-regulate behaviors**
 - **Lack of responsiveness to others**



EFFECTS OF BRAIN INJURY

- **Pre-School (3 to 6 Years):**
 - Very basic understanding of cause-and-effect relationships
 - Developing ability to think before acting
 - Focuses on one aspect of the situation at a time
 - Emotional focus is on control and mastery
 - Concrete and rigid thinking
- **Behaviors after TBI:**
 - Temper tantrums
 - High emotionality
 - Impulsivity
 - Primitive behaviors (biting, hitting, etc.)
 - Lack of concern for danger and safety
 - Resistance to influence or direction from parents



EFFECTS OF BRAIN INJURY

- **Elementary (6 to 12 years):**
 - Robust understanding of cause-and-effect relationships
 - Ready to learn academic skills
 - Focus on effort as important
 - Recognize intention of acts as important
- **Developmental Disruptions Following Brain Injury (6 to 12 years):**
 - Disruption in reading, spelling, math skills
 - Poor performance despite hard work
 - School failure/avoidance
 - Behavior problems during unstructured times
 - Depression, social isolation or withdrawal from peers
 - Sleep disturbance
 - Fatigue



EFFECTS OF BRAIN INJURY

Early Adolescence (12 to 16 years):

- Considers three or more dimensions simultaneously
- Abstract reasoning
- Increasing autonomy
- Beginning identity development
- Social stereotyping
- Responsibility: able to care for self, babysit, perform jobs for pay

Developmental Disruptions Following Brain Injury (12 to 16 years):

- Unevenness in cognitive profile
- New learning deficits
- Slower rate of processing
- Difficulty organizing complex tasks over time
- Judgment and reasoning difficulties
- Increased “frustration” response
- Depression and/or fatigue



EFFECTS OF BRAIN INJURY

Late Adolescence (16 to 19 years):

- Complex reasoning and judgment
- Ability to plan and execute complex projects over time
- Solid sense of own identity based on positive identifications u
- Capacity for altruism

Developmental Disruptions Following Brain Injury (16 to 19 years):

- New learning deficits (e.g., memory for numbers)
- Mental processing speed deficits
- Inability to organize complex tasks
- Conflict between specific challenges and career goals
- Interference in developmental drive toward independence/separation
- Social awkwardness
- Fatigue and/or Depression
- Defensiveness regarding emotional/cognitive problems
- Body image/social image

TREATMENT APPROACHES



TREATMENT APPROACHES

****THE HUMAN BRAIN PRODUCES NEW CONNECTIONS!!!!****

- Until the 1970s it was commonly thought that the nervous system was essentially fixed.
- 1998 – Fred Gage & Peter Eriksson
- Plasticity – the brain's ability to rewire and alter brain tissue for the purpose of adapting to changes externally or internally²
- Structural plasticity – the change of physical structures by the brain due to environmental stimuli or injury
- Functional plasticity – the brain's ability to alter function from one area to another due to damage



TREATMENT APPROACHES

Team Approach

- Primary Care
- Neuropsychology/Psychology
- Neuropsychiatry
- Rehabilitation Specialists
 - Physical Therapy
 - Occupational Therapy
 - Speech Therapy
- School
- Family



TREATMENT APPROACHES

Medical Management

- Formal imaging (CT, MRI, etc.)
- Vestibular Disorders
- Neuropsychological testing to document symptoms



TREATMENT APPROACHES

Medical Management

- **Cardiopulmonary system**
 - Parts of the brain controlling heart may be affected by injury
- **Respiratory System**
 - Trauma to the larynx/trachea
- **Musculoskeletal System**
 - spasticity
- **Skin System**
 - Lacerations, abrasions, pressure ulcers
- **Gastrointestinal System**
 - Increase in metabolism, poor coordination, dysphagia
- **Neurological System**
 - Headaches, seizures



TREATMENT APPROACHES

Neuropsychological Evaluations

- **Assess**
 - Attention
 - Memory
 - Executive Functioning
 - Language
 - Visual-spatial
 - Adaptive skills
- **Suggest treatment planning based on neuropsychological pattern of strengths and weaknesses**



TREATMENT APPROACHES

Psychiatric Management

- **Psychiatric Manifestations may occur after Brain Injury and include:**
 - **Major depression**
 - **Anxiety**
 - **Bipolar disorder**
 - **Psychoses (Schizophrenia – like symptomatology)**
 - **Anxiety disorders – panic attacks, phobias, OCD**



TREATMENT APPROACHES

Therapies

- **Physical Therapy**
 - **Occupational Therapy**
 - **Cognitive Therapy**
 - **Speech Therapy**
 - **Psychotherapy/Family Therapy**
- 



TREATMENT APPROACHES

School Accommodations

Individualized Education Plan (IEP) or 504 Plan

Based on a child's physical and cognitive needs

- Motor Impairments
- Physical effects
- Feeding disorders
- Sensory impairments
- Communication impairments



TREATMENT APPROACHES

School Accommodations

- Fatigue
- Medical issues
- Social/emotional or behavioral difficulties
- Family difficulties
- Post-school or vocational issues



TREATMENT APPROACHES

School Accommodations

Cognitive/Learning Challenges

- Attention
- Memory
- Executive functioning
- Processing speed
- Splinter skills



TREATMENT APPROACHES

School Accommodations

Attention and concentration

- Provide clear learning objectives
- Provide short, concise instructions
- Shorten assignments; divide work into smaller sections
- Provide nonverbal attention cues
- Provide breaks
- Reward on-task behavior



TREATMENT APPROACHES

School Accommodations

Memory and learning problems

- Provide learning objective for each lesson
- Link new information to relevant prior knowledge
- Provide hands-on learning opportunities
- Frequently repeat and summarize information
- Use organizers (preferably in written format)
- Provide an extra set of books for home



TREATMENT APPROACHES

School Accommodations

Organization

- Provide templates for assignments, projects, and papers
- Provide visual schedules
- Provide assistance with homework planners
- Backpack check
- Provide assignments and notes on school website
- Utilize different colored notebooks for each subject
- Break down long-term projects into parts with specific timelines



TREATMENT APPROACHES

School Accommodations

Following directions

- Provide oral and written instructions (bi-modal learning)
- Highlight written directions
- Task-analyze directions into simple steps



TREATMENT APPROACHES

School Accommodations

Auditory-perceptual

- Limit amount of information presented
- Speak more slowly to allow for assimilation of information
- Provide visuals with auditory information (bi-modal learning)
- Use a buddy system to help repeat instructions



TREATMENT APPROACHES

School Accommodations

Visual-perceptual

- Limit amount of information on one page
- Use large print
- Present materias on a slant
- Provide longer viewing times
- Offer seating close to the front
- Use arrows or cue words for orientation
- Provide maps or teach students to navigate new schedules



TREATMENT APPROACHES

School Accommodations

Motor-Physical

- Use of assistive technology and adapted devices to provide better access
- Allow extra time for tasks and changing classes
- Adapted physical education

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